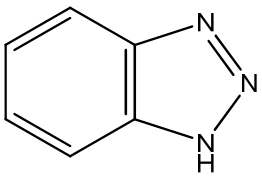
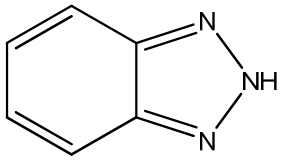
➢ Introduction:

The present work is in connection with the novel ligands having structural moieties of heterocyclic rings such as benzotriazole and complex forming agent such as 8-hydroxy-quinoline and salicylic acid. Hence, both moieties have been introduced briefly.

Benzotriazole ($C_6H_5N_3$) is a nitrogen heterocycle derivative containing three nitrogen atoms, each with an unshared lone pair of electrons, forming a five-membered ring that can exist in the following tautomeric forms.



I



II

Benzotriazole are of wide interest because of their diverse biological activities and chemical applications [1-3]. Several classical synthetic methods have been reported for the synthesis of Benzotriazole derivatives [4,5]. 5-benzoyl Benzotriazole is produced by reaction of 4-benzoyl-o-phenylenediamine, sodiumnitrite and acetic acid. The conversion proceeds via diazotization of one of the amine groups [6]. Benzotriazole is fairly water-soluble, not readily degradable and has a limited sorption tendency. Hence, it is only partly removed in waste water treatment plants and a substantial fraction reaches surface water such as rivers and lakes [7].

Research in the field of complex forming reagents (CFRs) (i.e. ligands) is one of the most active areas in inorganic and analytical chemistry [8,9]. The development of CFRs was stimulated by research progress in coordination chemistry and by studies of complex equilibria in solution. At present the significance of CFRs is considered by many as having decreased in favors of instrumental methods, especially for routing, trace and automated analysis [10-12].

The reactivity of CFRs depends in the nature of steric arrangement of the donor atoms. Usually O, N, S in the ligands, the number of donor atoms bond to the analyte, the type of outer electronic shell of the analyte ion and for overall structure of the reagent [13,14].

Some of the well known CFRs are:

(a) Salicylic acid

(b) 8-hydroxy quinoline

(c) 2-hydroxy-3-naphthoic acid etc.

In the formation of metal complexes of the organic compounds (say ligands) play an important role for many applications. Some of the natural complexes such as chlorophyll and hemoglobin are too much important biologically.

The synthesis of N-(1-chloroacetyl)-benzotriazole is reported moiety in literature [1]. Further condensation of above compound with various complex forming agent to yield novel ligands. Here following complex forming agent taken are:

(1) 5-amino-8-hydroxy quinoline

(2) 4-amino salicylic acid

(3) 5-amino salicylic acid

(4) Anthranilic acid

(5) 5-bromo anthranilic acid

(6) 2-amino acetic acid (Glycine)

(7) 2-amino propanoic acid (Alanine)

After systematic literature survey indicates that the metal chelation of such series novel ligands has not been reported till now. In other word, the benzotriazole derivatives containing complexing agent's i.e. 8-hydroxy quinoline, salicylic acid have not been reported so far.

Thus, the objective of the thesis work is given below,

- **Objective:**

To explore the synthesis, characterization and chelating properties of 5-benzoyl benzotriazole-8-hydroxy quinoline, 5-benzoyl benzotriazole anthranilic acid and 5-benzoyl benzotriazole salicylic acid molecule.

According to the objectives, the Ph.D. research work was carried out. The work will be bifurcated into following chapters of the proposed thesis.

Chapter-1: Chapter-1 will be an introduction. The brief review about benzotriazole derivatives, metal complexing reagents, research gaps, objective and the present work will be summarized in this chapter.

Chapter-2: Brief introduction about different techniques used for characterization of compounds will be presented in chapter-2.

Chapter-3: synthesis and characterization of novel ligands (L-1 to L-7) will be included in this chapter.

Different complex forming agents are taken. Here we are interested in 5-amino-8-hydroxyquinolinol, 4-amino-salicylic acid, 5-amino-salicylic acid, Anthranilic acid, 5-bromo anthranilic acid, 2-amino acetic acid and 2-amino propanoic acid moiety. Amino group presence in above moiety condensed with N-(1-chloroacetyl)-5-benzoyl benzotriazole by removal of HCl to yield novel ligands (L-1 to L-7).

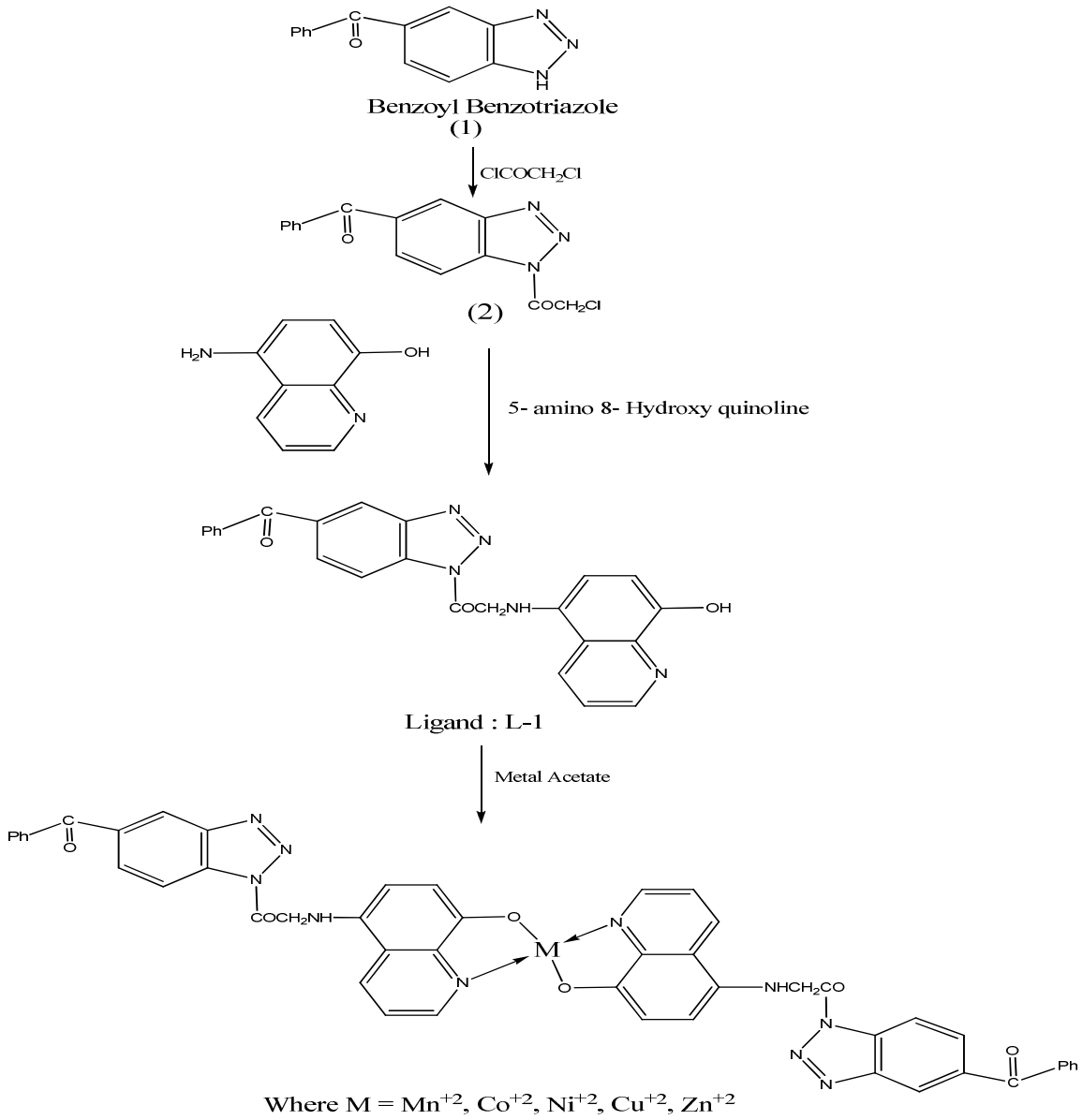
These derivatives i.e. L-1 to L-7 were characterized by elemental and spectral features. The non-aqueous conductometric titration of all the compounds was carried out to estimate the number of hydroxyl as well as acid group.

Chapter-4: The various transition metal chelates of all the novel ligands (mentioned in chapter-3) were prepared and characterized primarily. The methods for metal-chelates preparation and metal:ligand (M:L) stoichiometry will be presented in chapter-4.

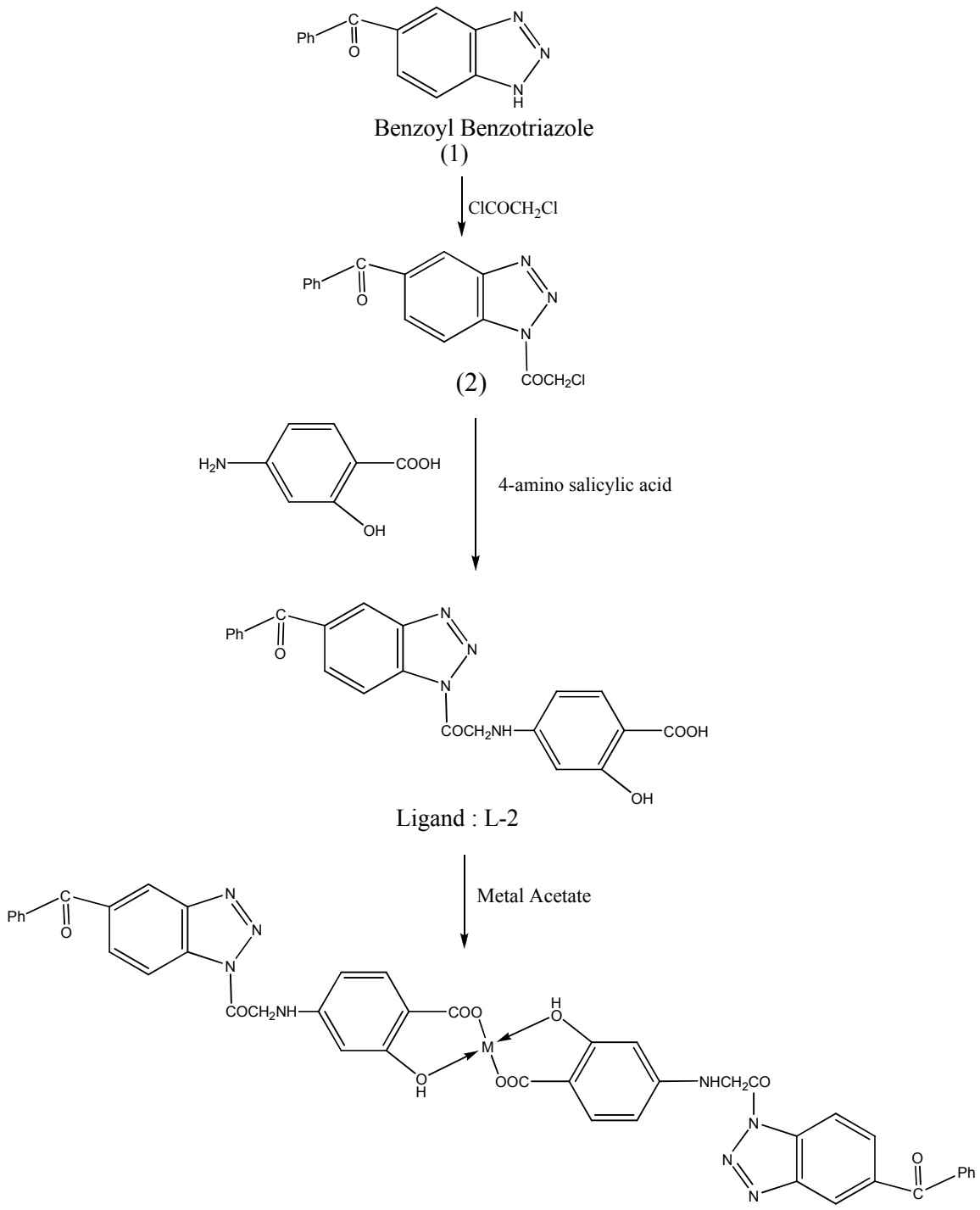
Chapter-5: This chapter will be including the characterization of metal chelates. Characterization include Infrared spectra, Nuclear magnetic resonance and reflectance spectral study. All these will be included in chapter-5 of the thesis.

Chapter-6: The chapter-6 will comprise of the evaluation of antimicrobial activity of all the ligands and their metal chelates. Various plant pathogens have selected for this study.

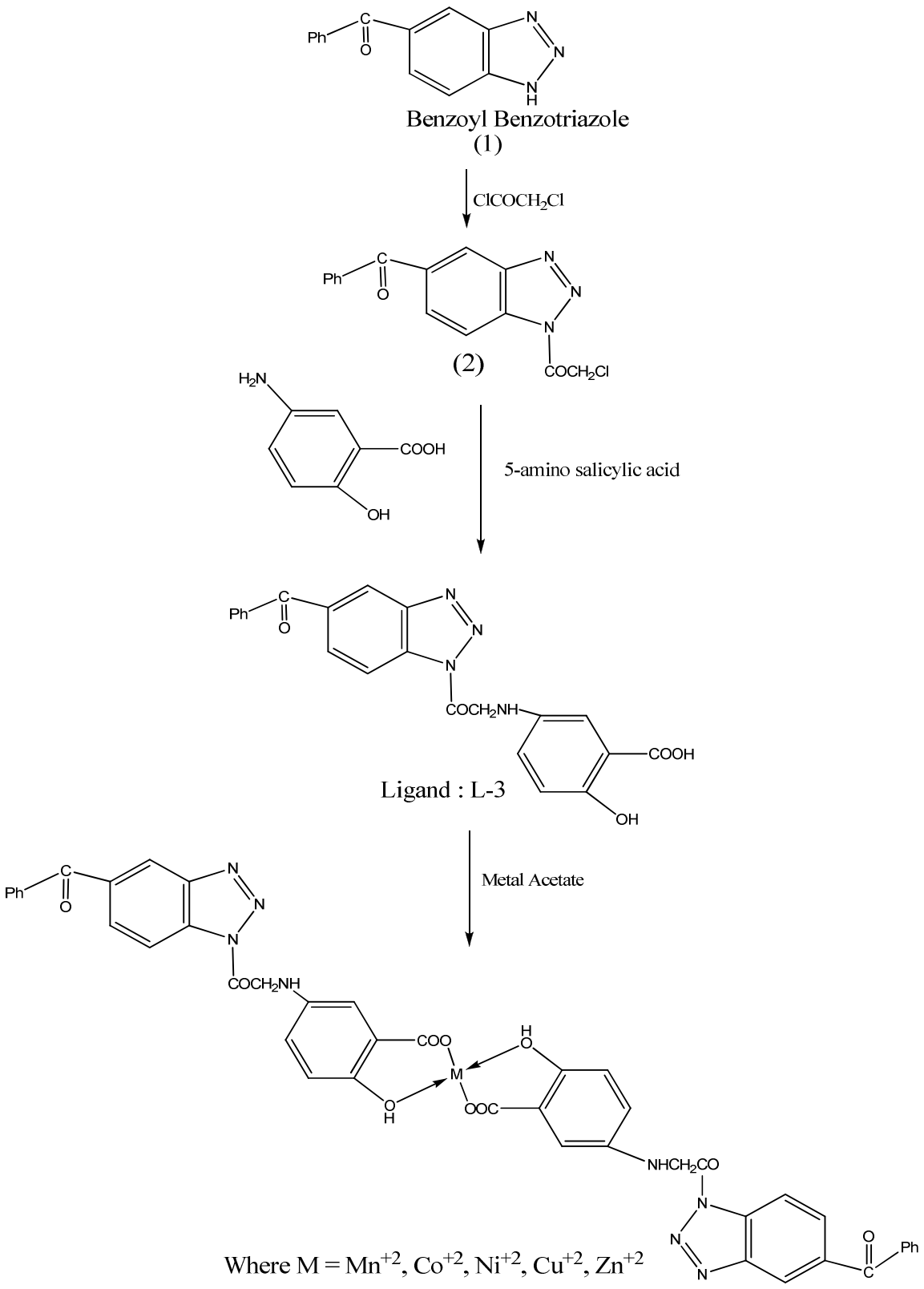
The work is summarized in Scheme-1,2,3,4,5,6 and 7.



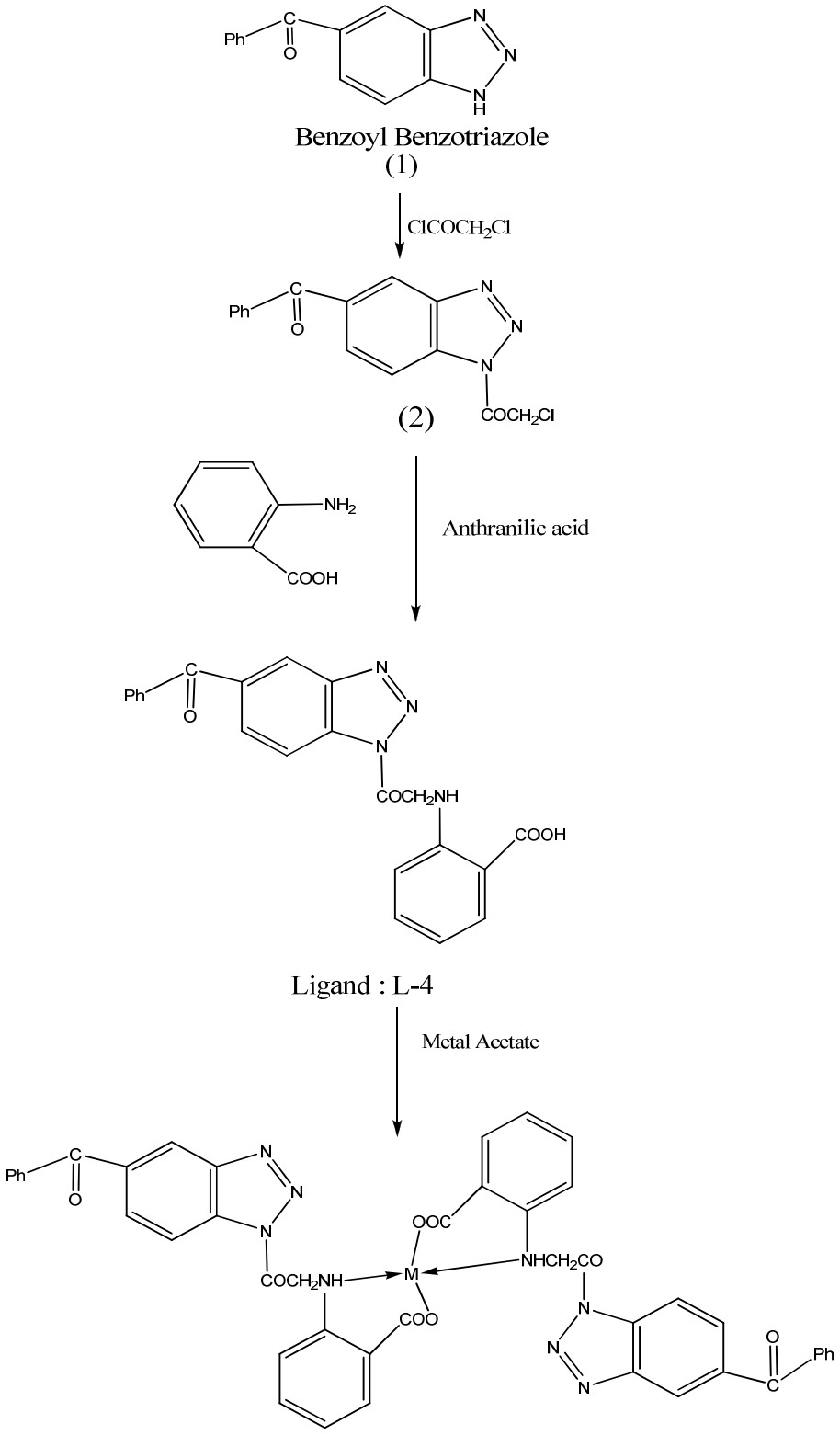
Scheme 1


Benzoyl Benzotriazole
(1)
ClCOCH2Cl
(2)
4-amino salicylic acid
Ligand : L-2
Metal Acetate
Where M = Mn+2, Co+2, Ni+2, Cu+2, Zn+2

Scheme 2

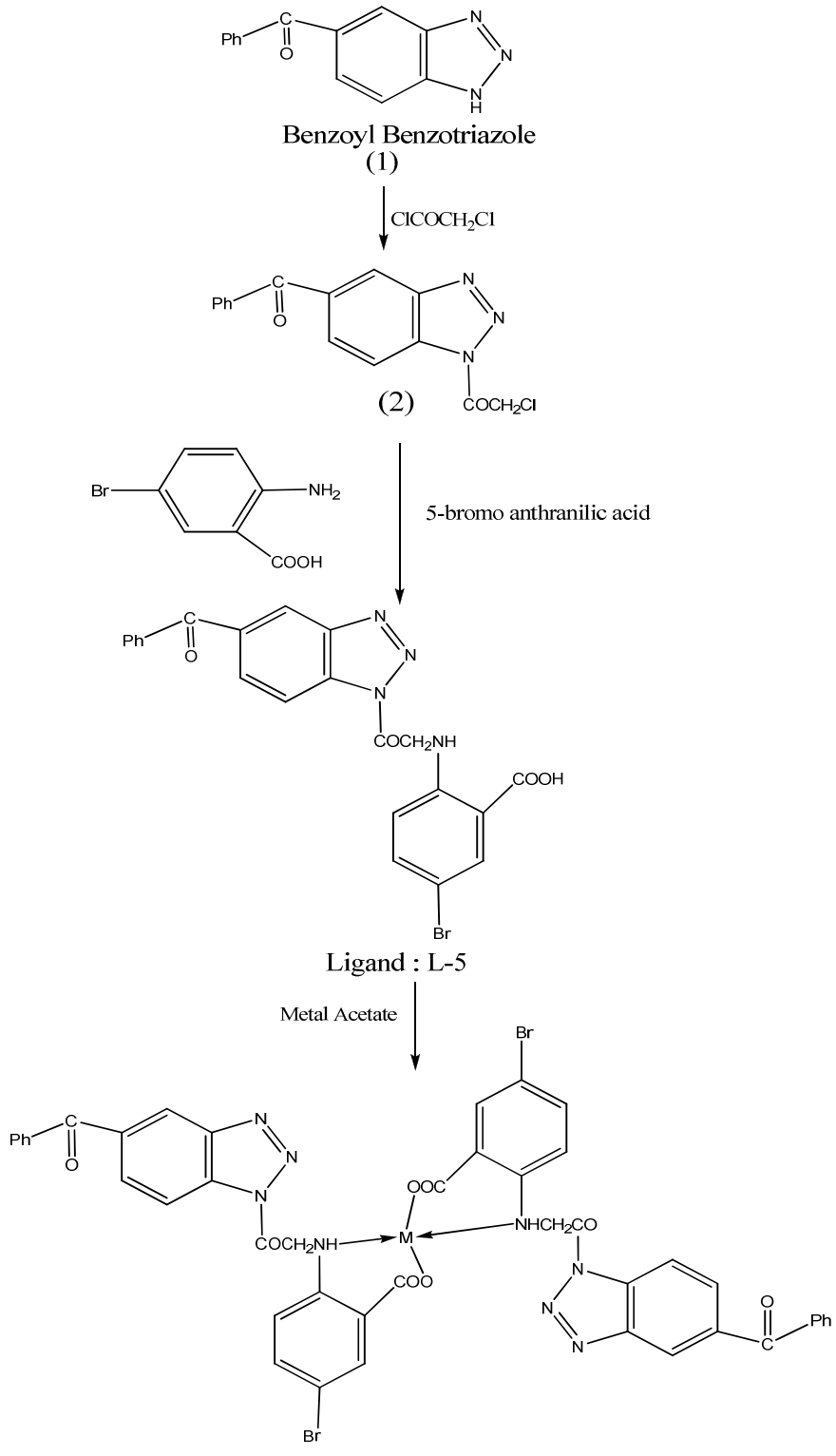

Benzoyl Benzotriazole
(1)
ClCOCH2Cl
(2)
5-amino salicylic acid
Ligand : L-3
Metal Acetate
Where M = Mn+2, Co+2, Ni+2, Cu+2, Zn+2

Scheme 3

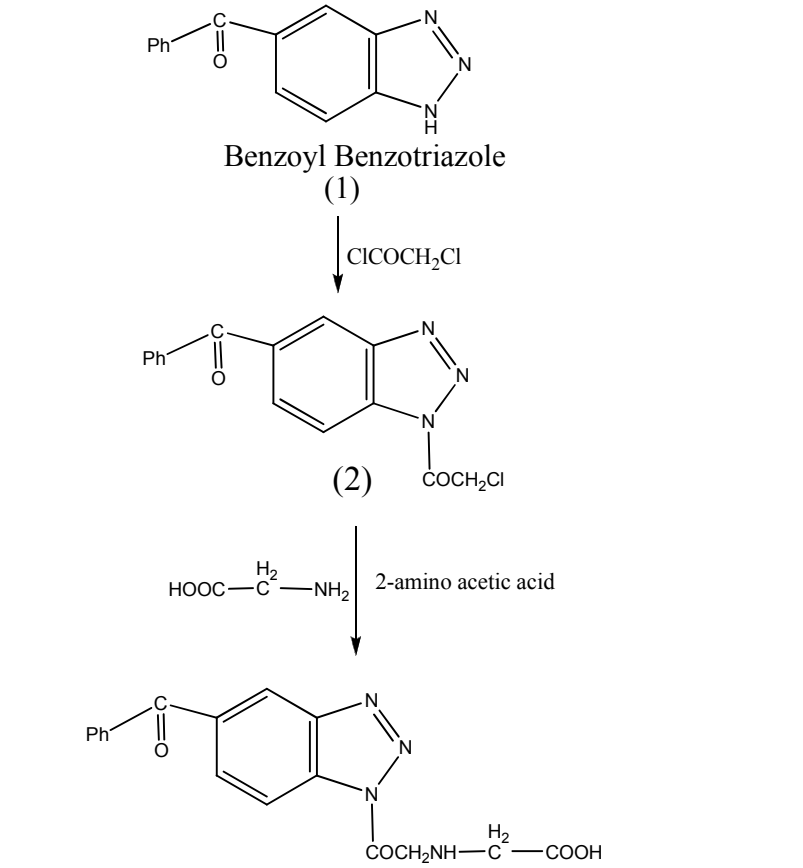


Where M = Mn^{+2}, Co^{+2}, Ni^{+2}, Cu^{+2}, Zn^{+2}

Scheme 4

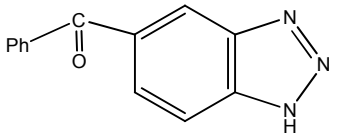

Benzoyl Benzotriazole
(1)
ClCOCH2Cl
(2)
5-bromo anthranilic acid
Ligand : L-5
Metal Acetate
Where M = Mn+2, Co+2, Ni+2, Cu+2, Zn+2

Scheme 5

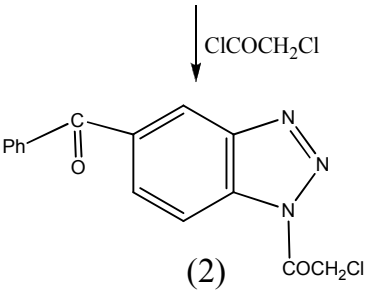


Where M = Mn^{+2}, Co^{+2}, Ni^{+2}, Cu^{+2}, Zn^{+2}

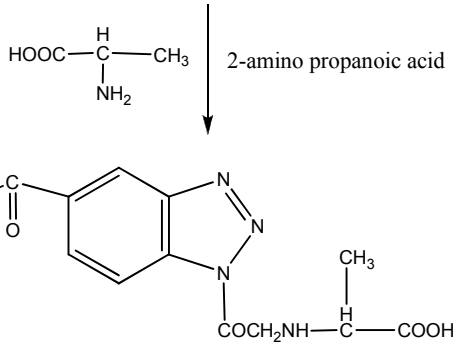
Scheme 6



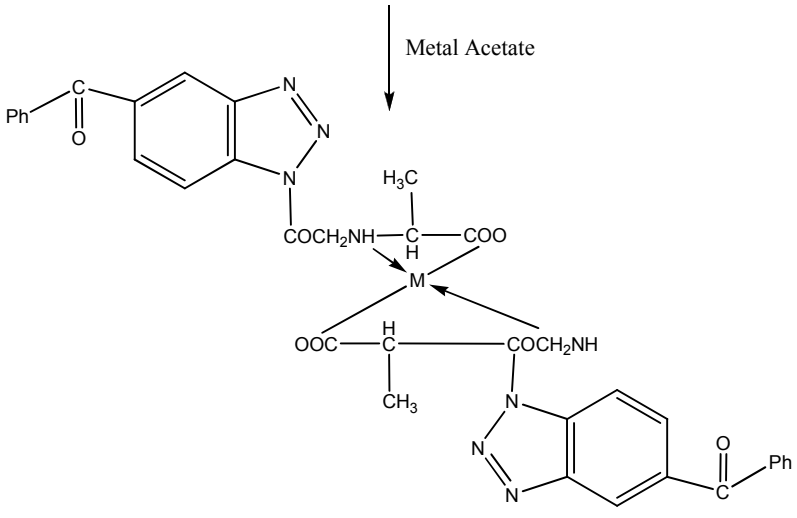
Benzoyl Benzotriazole
(1)



(2)



Ligand : L-7



Where M = Mn^{+2}, Co^{+2}, Ni^{+2}, Cu^{+2}, Zn^{+2}

Scheme 7

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Signature of Supervisor
(Dr Piyush Desai)

Signature of Student
(Daxesh Parekh)